Volatile Fatty Acids

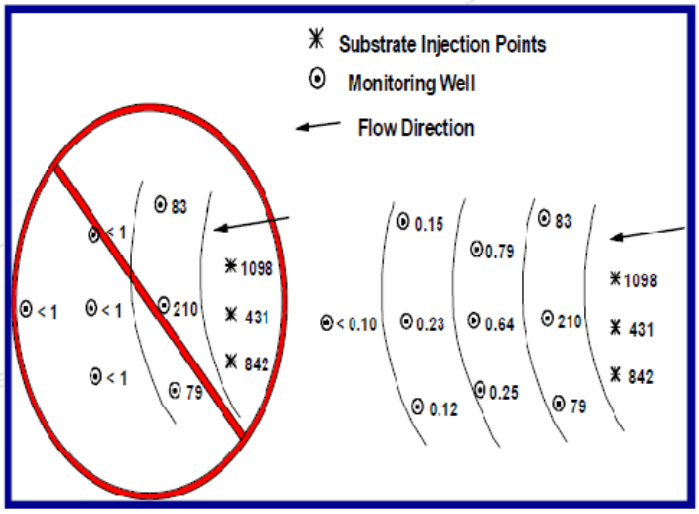
With the proliferation of enhanced biodegradation as a remediation technology, PAES recognized the need to provide analytical support to clients using organic substrates to stimulate anaerobic biodegradation.

Injected substrates are fermented by the in-situ microbial community into volatile fatty acids. The presence of these acids after the addition of a Substrate is evidence of activity of the microbial process. This rather unique suite of so called volatile fatty acids (VFAs) is also a convenient tracer to monitor where the treated water flows.

The older method for determination of VFAs was a gas chromatograph (GC) method with a detection level of about 15 mg/L for lactic acid, 5 mg/L for pyruvic and about 1 mg/L for the rest. Given these detection levels, VFAs could not be traced very far along the groundwater flow path before the concentration was below the detection level. Reports would often show reductive dechlorination in areas where VFAs were not detected, giving the impression that the engineered stimulation was not responsible for reductive dechlorination. Therefore, it became important to be able to look at very low concentrations of VFAs so the migration of the acids could be used as a tracer.

PAES developed a new methodology for analysis of VFAs which uses ion chromatography (IC) instead of gas chromatography (GC). This method has achieved significantly lower detection levels in the range of a few tens of ug/L.

Additionally, Pace has extended the method to include the 5 and 6 carbon acids to accommodate clients who are using vegetable oils and other organic substrates.



Volatile Fatty Acid Reporting Limits

Compound Name	Acetic Acid	Propionic Acid	Butyric Acid	Pyruvic Acid	Lactic Acid	n-Pentanoic Acid	i-Pentnaoic Acid	n-Hexanoic Acid	i-Hexanoic Acid
Low Level PQL (ppm)	0.10	0.10	0.10	0.10	0.20	0.10	0.10	0.20	0.20